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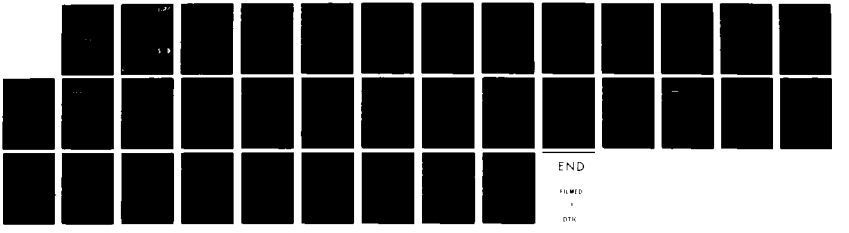

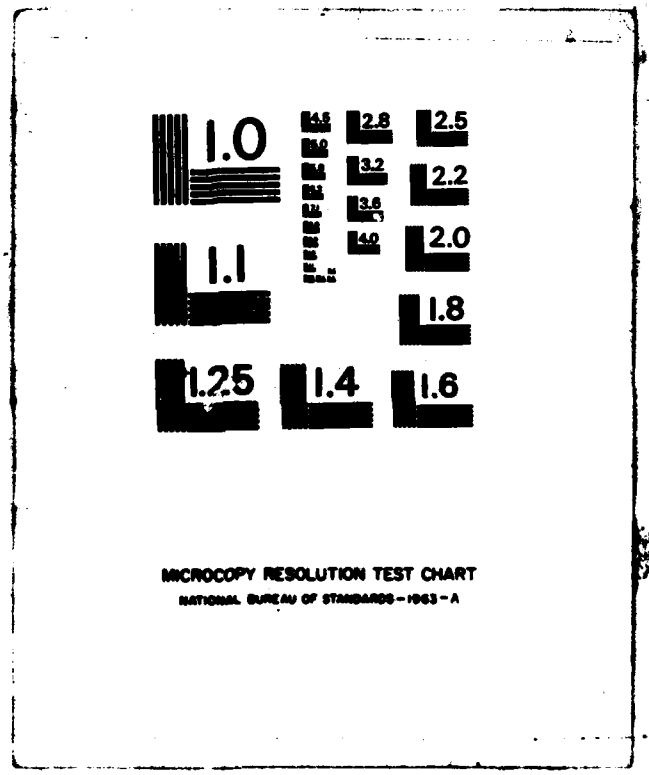
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AN EVALUATION OF AIM-7F MISSILE READINESS INITIATIVES

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The repair process for Guidance and Control Sections (G&C) of the AIM-7F missile is constrained at present by a lack of any shipping containers for individual items. Rather, the entire G&C must be delivered to depot repair when either of its two major components fails. The objective of this study is to provide an automated method of assessing missile availability, and use this model to evaluate the tradeoff between G&C spare stock and specialized shipping containers.

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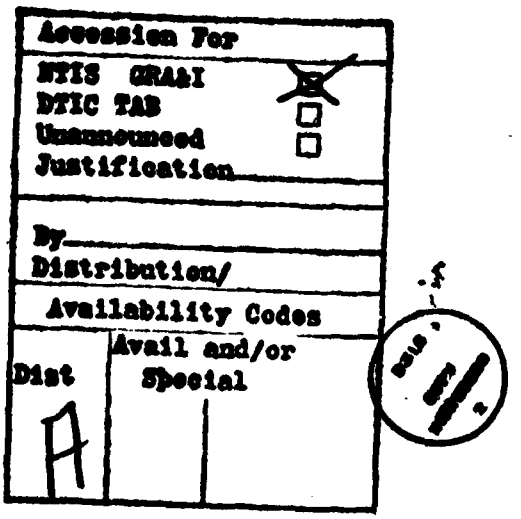

INTRODUCTION AND PURPOSE

The AIM-7F sparrow is an air intercept missile which is currently maintained in both US Air Force and Navy inventories.

This paper presents the results of a study of AIM-7F readiness initiatives. There are approximately 4,450 of these missiles in Air Force inventory today, but no spare Guidance and Control Sections (G&Cs) were ever procured. As a result, some missiles are unserviceable while they await the return of serviceable G&Cs through the resupply pipelines. HQ AFLC/LORIS came to HQ AFLC/XRS in August 1981, and requested help in determining the best quantities of spare G&Cs to be procured.

The second half of this working paper describes the computer program Missile Facility Simulator (MFS), which can be used to predict future states of the AIM-7F resupply system, and ask some "what if..." questions while varying any of several parameters.

This allows one to see the impact today's actions will have at a later point in time, and can be especially helpful in the planning stages by indicating potential problem areas.

BACKGROUND

The items on the missile which are subject to time related failure and subsequently require repair are the Target Seeker (TS) and the Flight Control (FC), which collectively are called a Guidance and Control Section. The USAF missile inventory has increased from 4,437 in 1981 to 4,915 in early 1982 and will decrease from that level to around 4,350 by the year 1986. On the average, there will be about 4,450 AIM-7Fs (Figure 1).

AIM-7F MISSILE INVENTORY (22 JULY 1981)

	1st	2nd	3rd	4th
FY 81				4437
FY 82	4915	4646	4616	4586
FY 83	4562	4538	4514	4490
FY 84	4475	4460	4445	4430
FY 85	4415	4400	4385	4370
FY 86	4355	4340	4325	4310

FIGURE 1

The above quantities are the net result of on-hand, due-in, and due-out missiles. Those which are due-out include scheduled test firings, training, and Foreign Military Sales (FMS). In each of these cases, the missiles are not replaced with AIM-7Fs on a one-for-one basis; Rather, AIM-7Ms will be procured to replace AIM-7Fs depleted through FMS. Also, several AIM-7Fs will be converted to AIM-7Ms by removal and replacement of the -7F G&C with a -7M G&C. This is because it has been decided that the

AIM-7F G&C spares requirement will be satisfied with -7M G&Cs, which enhance capability at a lower overall cost. While this study is not concerned with the AIM-7M, which be funded by BP26, initial spares, this increase in the number of AIM-7Ms will need to be supported, and must be considered when determining AIM-7M spares requirements.

The decision to buy -7M G&Cs mentioned above was made at the AIM-7 Readiness Initiatives Meeting, July 1981, at Warner Robins Air Logistics Center. There it was also stated that the buyout of spare G&Cs should not include safety stock since there is no guideline (10%, 20%, 50%). Only 80% funding of the pipeline; the expected number in repair, in transit, or awaiting repair or transportation would be procured. But even this low level was decreased in December 1981, when it was discovered that rising production costs and limited funds would reduce the funding to roughly 40% of the pipeline. It was at this time that the main thrust of this study shifted--how to increase missile availability, given a dollar constraint, by possibly spending some of the available funds to reduce the size of the pipeline, and thus bring up more missiles. This is discussed further in the next section, Maintenance Policies.

MAINTENANCE POLICIES

The present AIM-7F maintenance system (Figure 2) has a problem. There are no individual shipping containers for Target Seekers (TS) and Flight Controls (FCs) respectively. This means that if a FC is found to be failed, maintenance must wait for a mate to fail (a TS in this case) before shipping the pair to the depot for repair. The empty space cannot be filled with foam in this particular situation because of physical constraints and sensitivity of the equipment, but there is an alternative. A serviceable mate can be sent along for the ride (44 days) and either bring down another missile or reduce the ready rate and expected availability. A further complication is that the TS fails about twice as often as the FC. Now it may have been the extremely low rates of .0043 and .0021 G&C removals per quarter that prompted the designers of this system to not be concerned about the dual containers and lack of spares, but as a simulation program written for this study points out, there is reason for concern.

AIM-7F CURRENT MAINTENANCE SYSTEM

FIGURE 2

Another problem with the present containers is that they inhibit lateral resupply of TSs and FCs between missile locations. Lateral resupply isn't practical with the dual containers since operational spare sections would be made unavailable and possibly

cause a serviceable missile to be taken down while they fill space during shipment. Lateral resupply would be most helpful in the event of war, since long repair cycles could otherwise make many missiles useless throughout the first 141 days of war, well beyond the surge.

MISSILE FACILITY SIMULATOR PROGRAM

The Missile Facility Simulator (MFS) is a computer program which simulates the AIM-7F resupply system. The effect of changes to the maintenance policy, spares stock levels, missile inventory levels, pipeline times, etc., can be seen in missile availability measures. Potential problem areas such as constraints on transportation can also be seen in the output.

The program is written in GPSS (General Purpose Simulator System), an event oriented simulation language. It also contains some FORTRAN subroutines which format and summarize data before tables are printed.

The resupply system was modeled as explicitly as possible given the available data. The total number of missiles was input as data, and since actual missile inventory levels at specific locations are classified (and therefore could not be run on the CREATE computer at Wright-Patterson AFB). The total number of missiles, spare G&Cs, and individual item containers are distributed among the number of operating loctions. By selecting a somewhat wide range of levels, from location-to-location, one gets a good idea of how the system behaves as a whole, and also how the different levels affect backorders at individual locations. This last point is mentioned because the more missiles there are at a facility, the greater the likelihood of simultaneous failure of a Target Seeker and a Flight Control, and consequently a dual container can be used for shipping to depot repair without a "waiting-mate" delay.

Failures are generated by a Poisson frequency distribution function, and repair times are assumed to be uniform around the mean.

The quantities of missiles, Target Seekers, Flight Controls, and individual containers are entered into the program by means of FUNCTION statements. A description can be found at the right of each FUNCTION statement which tells what the records directly below the statement refer to. For example:

17 FUNCTION PH1 D15 TS CANS 1,10/2,10/3,10/4, 10/5,10/6,20/7,20/8,20/9,20/10,20/11,30/12,30/13,30/14,30/15,30/

tells us that bases 1-5 have 10 Target Seeker single containers, 6-10 have 20, and 11-15 have 30. These FUNCTION statements are located at the end of the program.

RECOMMENDATIONS

As mentioned in the introduction, by the time this study was nearly completed, the available funding dropped to such a level that only 50 Guidance and Control sections could be afforded. Note also that for the cost of one of these G&Cs, enough TS and FC individual containers could be procured to reduce the "waiting mate" time to essentially zero.

The following options are presented with their impact on missile availability so that you can see the benefit of having separate containers for individual TSs, FCs. Also included are assessments of a pipeline buy (90 spares) and the current state of the system (0 spares).

G&C SECTIONS PROCURED	TS, FC SEPARATE CONTAINERS PROCURED	AVAILABLE MISSILES	IMPROVEMENT FROM NO SPARES/CANS	IMPROVEMENT FROM 49 SPARES NO CANS
49	0	4439.2	45.6	.0
50	0	4439.8	46.2	.6
49	400	4445.5	51.9	6.3
90	400	4476.2	62.6	17.0
0	0	4393.6		

It is clear that it's better to spend the last $161,000 on individual containers rather than on another G&C since the containers bring up more than 10 times as many missiles. The containers also make lateral resupply between the bases feasible.

MFS PROGRAM DOCUMENTATION

A listing of the Missile Facility Simulator is given below. Three FORTRAN subroutines which the GPSS program uses are also included. Anyone who has permission to use the CREATE computer system can access and run this program by typing CARD OLD MEAN/MFS, R at the SYSTEM level, making the necessary routing and data changes, and then typing RUN.

```
10$NS :,8,16,30;:,8,19
20$:IDENT:[redacted]
30$:LIMITS:,,,10K
40$:SELECT:AF.LIB/GPSS6A
50$:OPTION:FORTRAN,MAP
60$:SELECT:MEAN/MSUBS.O
70$:SELECT:AF.LIB/GPSS6B
80$:SELECT:AF.LIB/GPSS6C
90$:PRMFL:PF,R,S,AF.LIB/GPSS.PF
100$:LIMITS:15,40K,-1K,10K
110$:FILE:H*,X1R,20R
120:SIMULATE;,,,,PL
130:CONTROL;XAC,500,BLO,300,STO,150,CHA,50,VAR,35,HSV,200
140:UNLIST;ABS
150:INITIAL;XF18,-1
160 :INITIAL;XF17,1
170*
180*   THIS ROUTINE GENERATES THE EXPECTED NUMBER OF REMOVALS BY BASE
190* EVERY QUARTER (90 DAYS). A TEST IS THEN MADE TO DETERMINE
200* IF BOTH THE TARGET SEEKER (TS) AND FLIGHT CONTROL (FC) HAVE FAILED.
210* IF YES, THE PROCESS SPLITS INTO TWO BRANCHES. THE FIRST, BASLE,
220* REPRESENTS THE MISSILE NEEDING BOTH COMPONENTS. A DEPOT UNFILLED
230* DEMAND IS CREATED. A CHAIN (V10) CONTAINING MISSILES WAITING FOR
240* BOTH COMPONENTS IS INCREMENTED. IF BOTH SPARES EXIST, THE CHAIN IS
250* DECREMENTED AND THE UNLINKED MISSILE DEMAND IS SENT TO BPARE WHERE
260* THE SPARE COUTERS ARE DECREMENTED AND A MISSILE IS BROUGHT UP.
270*
280:GENERATE;0,0,0,1,,4PH   EVERY THREE MONTHS
290:SPLIT;14,INIT1,1PH   FOR 15 BASES
300 INIT1:SAVEVALUE;PH1,FN16,XH     INITIALIZE TS SPARES
310 :SAVEVALUE;V2,FN16,XH     INITIALIZE FC SPARES
320 :ENTER;V19,FN17     INITIALIZE TS CANS
330 :ENTER;V20,FN18     INITIALIZE FC CANS
340 :TRANSFER;,INIT
350*
360 :GENERATE;90,0,,,0,4PH
370 :SPLIT;14,INIT,1PH
380 INIT:SAVEVALUE;PH1,V23   INITIALIZE UP MISSILES
390 :SAVEVALUE;V28,FN*PH1,XH
400 REMO:SAVEVALUE;V8,V9,XH   EXPECTED NO. OF REMOVALS
405 :HELPA;3,PH1,XH*V8
410:SPLIT;XH*V33,SPRED   SPLIT OFF REMOVALS
420 MIX:TERMINATE
430 SPRED:ADVANCE;45,44   SPREAD REMOVALS THRU OUT QUARTER
```

```
440*
450:TRANSFER;.185,LEFT,BOTH   DID BOTH TS AND FC FAIL?
460 BOTH:HELPA;2,PH1,1,6      FAILURE BY COMPONENT COUNTER
470 :SPLIT;1,MARK
480 :ASSIGN;4,1      CODE AS DOUBLE
490 BMSLE:SPLIT;1,BDMND
500 BDOWN:SAVEVALUE;PH1-,1      TAKE MISSILE DOWN
510:SPLIT;1,BTEST    AWAITING BOTH COMPONENTS
520:LINK;V10,FIFO    CH6-20  NEEDS BOTH COMP
530*
540 BTEST:TEST G;CH*V10,0,NIX
550 :TEST G;V3,0,NIX    ARE SPARES AVAILABLE?
560:UNLINK;V10,NIX,1
570 BSPARE:SAVEVALUE;PH1-,1,XH    REDUCE TS SPARES
580:SAVEVALUE;V2-,1,XH    REDUCE FC SPARES
590:SAVEVALUE;PH1+,1    BRING MISSILE UP
600:TERMINATE
610*
620 BUFDM:LINK;V10,FIFO    WAITING FOR BOTH COMPONENTS
630 BDMND:LINK;1,FIFO    BASE UNFILLED DEMAND
640*
650*    THE SECOND BRANCH, BCOMP, REPRESENTS THE TWO COMPONENTS RE-
660* MOVED FROM THE MISSILE AND SENT TO THE DEPOT. THE COMPONENTS ARE
670* FIRST DELAYED FOR TRANSPORTATION TIME. THEY ARE TAGGED AS 1 (TS)
680* OR 2 (FC) IN PARAMETER 3. THEY ARE REPAIRED AND ADDED TO DEPOT
690* STOCK. A DEPOT UNFILLED DEMAND IS UNLINKED AND SENT TO TEST4. THE
700* GATE ALLOWS ONLY ONE DEMAND TO BE PROCESSED AT A TIME. AT TEST4, PH4
710* IS TESTED TO SEE WHAT TYPE OF DEMAND IT IS - 1 (DOUBLE CAN), 2 (SINGLE
720* TS) OR 3 (SINGLE FC). A TEST IS MADE TO SEE IF THE DEMAND CAN BE
730* FILLED. IF YES, APPROPRIATE DEPOT SPARE COUNTERS ARE DECREMENTED, THE
740* GATE IS OPENED TO ALLOW ANOTHER DEMAND TO BE PROCESSED. IT IS THEN
750* DELAYED FOR DTOB TRANSPORTATION AND THEN THE SPARE(S) ARE ADDED TO
760* BASE STOCK. CONTROL IS TRANSFERED TO CHECK TO SEE IF ANY MISSILES
770* CAN BE BROUGHT UP. IF THE DEMAND CAN NOT BE PROCESSED, IT IS RELINKED
780* TO THE DEMAND CHAIN AND THE GATE IS OPENED.
790*
800 MARK:ENTER;V29      TS BASE PIPELINE BY BASE
810 :ENTER;V30      TS TOTAL PIPELINE BY BASE
820 :ENTER;V31      FC BASE PIPELINE
830 :ENTER;V32      FC TOTAL PIPELINE BY BASE
840 :ENTER;3       TOTAL PIPELINE
850 BCOMP:HELPA;2,PH1,1,1
860 :LEAVE;V29      TS READY TO SHIP
870 :LEAVE;V31      FC READY TO SHIP
880 :ADVANCE;V14    DTOB TRANS
890 :HELPA;2,PH1,XF18,1
900 :SPLIT;1,BRITE
910 BLEFT:ASSIGN;3,1    POSITION CODE
920:TRANSFER;,INURK
930 BRITE:ASSIGN;3,2    POSITION CODE
940 INURK:HELPA;2,PH1,1,3
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```
950 :ADVANCE;V13   STANDARD INWORK TIME
960 :HELPA;2,PH1,XF18,3
970 SPARE:ENTER;PH3   ADD TO DEPOT STOCK
980 :GATE LR;1     ONLY ALLOW ONE IN AT A TIME
990 :UNLINK;1,TEST4,1     UNLINK NEXT DEMAND
1000 :LOGIC S;1     CLOSE THE-GATE
1010 :TERMINATE
1020*
1030 TEST4:TEST NE;PH4,1,DBLE     DOUBLE CONTAINER?
1040 :TEST E;PH4,2,ONEFC     SINGLE TS?
1050 :TEST G;S1,0,RLINK     DEPOT SPARES?
1060 :LEAVE;1     REDUCE TS SPARES
1070 :LOGIC R;1     OPEN THE GATE
1080 :HELPA;2,PH1,1,2
1090 :ADVANCE;V15     DTOB TRANS
1100 :HELPA;2,PH1,XF18,2
1110 :SAVEVALUE;PH1+,1,XH     ADD TO BASE STOCK
1120 :LEAVE;3     RETURN FROM DEPOT
1130 :LEAVE;V30     TS RETURN FROM DEPOT
1140 :ENTER;V19     ADD CAN TO STOCK
1150 :TRANSFER;,CHECK
1160*
1170 ONEFC:TEST G;S2,0,RLINK     DEPOT SPARES?
1180 :LEAVE;2     REDUCE FC SPARES
1190 :LOGIC R;1     OPEN THE GATE
1200 :HELPA;2,PH1,1,2
1210 :ADVANCE;V15     DTOB TRANS
1220 :HELPA;2,PH1,XF18,2
1230 :SAVEVALUE;V2+,1,XH     ADD TO BASE STOCK
1240 :LEAVE;3     RETURN FROM DEPOT - TOTAL
1250 :LEAVE;V32     FC RETURN FROM DEPOT
1260 :ENTER;V20     ADD CAN TO STOCK
1270 :TRANSFER;,CHECK
1280*
1290 DBLE:TEST G;V1,0,RLINK     DEPOT SPARES?
1300 :TRANSFER;,PARE
1310*
1320 RLINK:LOGIC R;1     OPEN THE GATE
1330 :LINK;1,LIFO     PUT BACK ON CHAIN - NO SPARES
1340*
1350 PARE:LEAVE;1   REDUCE TS STOCK
1360:LEAVE;2   REDUCE FC STOCK
1370 :LOGIC R;1     OPEN THE GATE
1380 :HELPA;2,PH1,1,2
1390:ADVANCE;V15   DTOB TRANS
1400 :HELPA;2,PH1,XF18,2
1410:SAVEVALUE;PH1+,1,XH   ADD TO BASE STOCK
1420:SAVEVALUE;V2+,1,XH   ADD TO BASE STOCK
1430 :LEAVE;3     RETURN FROM DEPOT - TOTAL
1440 :LEAVE;V30     TS RETURN FROM DEPOT
1450 :LEAVE;V32     FC RETURN FROM DEPOT
```

```
1460:TRANSFER;,CHECK
1470*
1480*   IF BOTH THE TS & FC HAVE NOT FAILED, A TEST IS MADE TO SEE IF
1490* JUST THE TS HAS FAILED GIVEN THAT THERE WAS A FAILURE AND BOTH
1500* COMPONENTS DID NOT FAIL. IF YES, A DEPOT UNFILLED DEMAND IS
1510* CREATED. THE PROCESS THEN SPLITS INTO TWO BRANCHES. THE FIRST,
1520* LMSLE, REPRESENTS THE MISSILE NEEDING A TS. A CHAIN (V11) CON-
1530* TAINING MISSILES AWAITING A TS IS INCREMENTED. IF A TS SPARE
1540* EXISTS, THE CHAIN IS DECREMENTED AND THE UNLINKED MISSILE DEMAND
1550* IS SENT TO LPARE WHERE THE TS SPARE COUNTER IS DECREMENTED AND A
1560* MISSILE IS BROUGHT UP.
1570*
1580 LEFT:TRANSFER;.750,RIGHT,LSPLT
1590 LSPLT:HELPA;2,PH1,1,4     FAILURE BY COMPONENT COUTER
1600 :SAVEVALUE;PH1-,1    TAKE MISSILE DOWN
1610:SPLIT;1,LCOMP
1620 LMSLE:SPLIT;1,LDOWN
1630 :LINK;V11,FIFO    FC AWAITING MATE
1640 LDOWN:TEST G;CH*V11,0,MIX
1650 :TEST G;XH*PH1,0,MIX    ANY SPARE TS'S
1660:UNLINK;V11,MIX,1
1670 LPARE:SAVEVALUE;PH1-,1,XH    REDUCE TS SPARES
1680:SAVEVALUE;PH1+,1    BRING MISSILE UP
1690:TERMINATE
1700*
1710*   SINCE THE BASE HAS JUST RECEIVED RESUPPLY FROM THE DEPOT, THIS
1720* ROUTINE CHECKS TO SEE IF THERE ARE ANY MISSILES AWAITING SPARES.
1730* EACH TEST CHECKS TO SEE IF AN UNFILLED DEMAND AND SPARE ARE
1740* AVAILABLE. MISSILES NEEDING ONLY ONE COMPONENT ARE FILLED FIRST.
1750* THIS ROUTINE WILL ALSO CANNIBALIZE ON COMPONENTS IF A MISSILE IS
1760* DOWN NEEDING A TS AND ANOTHER IS DOWN NEEDING A FC.
1770*
1780 CHECK:TEST G;V16,0,TRITE    ANY AWAITING TS & SPARE AVAILABLE?
1790:UNLINK;V11,MIX,1    REDUCE AWAITING TS
1800 CONT1:SAVEVALUE;PH1-,1,XH    REDUCE TS SPARES
1810:SAVEVALUE;PH1+,1    BRING MISSILE UP
1820*
1830 TRITE:TEST G;V17,0,TBOTH    ANY AWAITING FC & SPARE AVAIL?
1840:UNLINK;V12,MIX,1    REDUCE AWAITING FC
1850 CONT2:SAVEVALUE;V2-,1,XH    REDUCE FC SPARES
1860:SAVEVALUE;PH1+,1    BRING MISSILE UP
1870*
1880 TBOTH:TEST G;V18,0,CHAIN    AWAITING BOTH & SPARES?
1890:UNLINK;V10,MIX,1    REDUCE AWAITING BOTH
1900 CONT3:SAVEVALUE;V2-,1,XH    REDUCE FC SPARES
1910:SAVEVALUE;PH1-,1,XH    REDUCE TS SPARES
1920:SAVEVALUE;PH1+,1    BRING MISSILE UP
1930*
1940 CHAIN:TEST G;V21,0,MIX      CANNIBALIZE?
1950 :UNLINK;V11,MIX,1
1960 :UNLINK;V12,MIX,1
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```
1970 :SAVEVALUE;PN1+,1      BRING MISSILE UP
1980 :LINK;V10,FIFO      STRIPPED MISSLE DEMAND
1990*
2000*   THE SECOND BRANCH REPRESENTS THE FAILED TS LOOKING FOR A MATE.
2010* THE TS ENTERS A TS AWAITING MATE STORAGE. IF THERE IS NO FC AWAITING
2020* MATE TO THE DEPOT, A TEST IS MADE TO SEE IF THERE ARE ANY SINGLE
2030* CANS. IF NOT, THE TS WILL WAIT A MAX OF 10 DAYS FOR EITHER A FAILED
2040* FC OR A SINGLE CAN. AFTER THE MAX DELAY, TESTS ARE MADE TO SEE IF
2050* EITHER A SPARE FC EXISTS OR A SINGLE CAN. IF NOT, A MISSLE IS TAKEN
2060* DOWN. THE REMOVED FC PROCEEDS WITH THE TS TO THE DEPOT WHILE THE
2070* TAKEN DOWN MISSILE NEEDING A FC IS PUT ON A CHAIN AND CONTROL IS
2080* TRANSFERED TO CHECK TO CHECK FOR CANNIBALIZATION.
2090*
2100 LCOMP:ASSIGN;3,10   MAX # OF DAYS TO WAIT FOR MATE
2110 :ENTER;V29      TS FAILED
2120 :ENTER;V30      TS TOTAL PIPELINE BY BASE
2130 :ENTER;3       TOTAL PIPELINE
2140:ENTER;V4    TS AWAITING MATE
2150 TEST:TEST G;S*V4,0,MIX
2160 :TEST G;S*V5,0,WAIT   IS THERE FC AWAITING MATE?
2170:LEAVE;V5   REDUCE FC AWAITING MATE
2180:LEAVE;V4   REDUCE TS AWAITING MATE
2182 :SPLIT;1,LINKB
2190:TRANSFER;,BCOMP   SEND TO DEPOT
2192 LINKB:ASSIGN;4,1      CODE AS A DOUBLE
2194 :LINK;1,FIFO
2200*
2210 WAIT:TEST E;S*V19,0,RDUC1      ANY SINGLE CANS?
2220:ADVANCE;1   WAIT ONE DAY
2230:LOOP;JPN,TEST   LOOP FOR 10 DAY MAX
2240*
2242 :TEST NE;S*V4,0,MIX
2250 :TEST G;S*V19,0,TSTFC    ANY TS SINGLE CANS?
2260*
2270 RDUC1:LEAVE;V19      REDUCE SINGLE TS CANS
2280 :LEAVE;V4
2290 :ASSIGN;4,2      CODE AS A SINGLE TS
2300 :SPLIT;1,DLEFT
2310 :LINK;1,FIFO
2320*
2330 TSTFC:ASSIGN;4,1
2340 :LEAVE;V4
2350 :SPLIT;1,BBMND      BASE UNFILLED DEMAND
2360 :TEST G;XH*V2,0,NOFC   ANY SPARE FC'S?
2370:SAVEVALUE;V2-,1,XH   REDUCE FC STOCK
2380 CODE:SPLIT;1,DRITE   2 COMPONENTS
2390*
2400 DLEFT:ASSIGN;3,1   CODE AS TS
2410:ASSIGN;2,1   CODE AS FAILED
2420 :LEAVE;V29      TS READY TO SHIP
2430 BTOB:HELPA;2,PN1,1,1
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2440 :ADVANCE;V14   BTOB TRANS
2450 :HELPA;2,PH1,XF18,1
2460:TEST E;PH2,0,INURK   COMPONENT FAILED?
2470:TRANSFER;,SPARE   GOOD COMPONENT - ADD TO DEPOT STOCK
2480*
2490 BRITE:ASSIGN;3,2   CODE AS FC
2495 :ENTER;V32     FC TOTAL PIPELINE
2500:ASSIGN;2,0   CODE AS GOOD
2510:TRANSFER;,BTOD
2520*
2530 NOFC:SAVEVALUE;PH1-,1   TAKE MISSILE DOWN
2540:SPLIT;1,CODE
2550 SMSLE:SPLIT;1,CHECK
2560*
2570 LDANB:LINK;V12,FIFO   TS AWAITING MATE
2580*
2590*   SINCE BOTH COMPONENTS DID NOT FAIL AND THE TS ALONE DID NOT FAIL,
2600* THE FC FAILED. A DEPOT UNFILLED DEMAND IS CREATED. THE PROCESS THEN
2610* SPLITS INTO TWO BRANCHES. THE FIRST, RMSLE, REPRESENTS THE MISSILE
2620* NEEDING A FC. A CHAIN (V12) CONTAINING MISSILES AWAITING A FC IS
2630* INCREMENTED. IF A FC SPARE EXISTS, THE CHAIN IS DECREMENTED AND THE
2640* UNLINKED MISSILE DEMAND IS SENT TO RPARE WHERE THE FC SPARE COUNTER
2650* IS DECREMENTED AND A MISSILE IS BROUGHT UP.
2660*
2670 RIGHT:HELPA;2,PH1,1,5     FAILED COMPONENTS COUNTER
2680 :SAVEVALUE;PH1-,1   TAKE MISSILE DOWN
2690:SPLIT;1,RCOMP
2700 RMSLE:SPLIT;1,RDOWN   AWAITING TS
2710:LINK;V12,FIFO   TS AWAITING MATE
2720*
2730 RDOWN:TEST G;CH*V12,0,NIX
2740 :TEST G;XH*V2,0,NIX   SPARE FC AVAILABLE?
2750:UNLINK;V12,NIX,1   UNLINK UNFILLED DEMAND
2760 RPARE:SAVEVALUE;V2-,1,XH   REDUCE FC SPARES
2770:SAVEVALUE;PH1+,1   BRING MISSILE UP
2780:TERMINATE
2790*
2800*   THE SECOND REPRESENTS THE FAILED FC LOOKING FOR A MATE. THE FC
2810* ENTERS A FC AWAITING MATE STORAGE. IF THERE IS NO TS AWAITING MATE
2820* TO THE DEPOT, A TEST IS MADE TO SEE IF THERE ARE ANY SINGLE CANS
2830* IF NOT, THE FC WILL WAIT A MAX OF 10 DAYS FOR EITHER A FAILED TS
2840* OR A SINGLE CAN. AFTER THE MAX DELAY, TESTS ARE MADE TO SEE IF
2850* EITHER A SPARE TS EXISTS OR A SINGLE CAN. IF NOT, A MISSLE IS TAKEN
2860* DOWN. THE REMOVED TS PROCEEDS WITH THE FC TO THE DEPOT WHILE THE
2870* MISSILE TAKEN DOWN NEEDING A TS IS PUT ON A CHAIN AND CONTROL IS
2880* TRANSFERED TO CHECK TO CHECK FOR CANNIBALIZATION.
2890*
2900*
2910 RCOMP:ASSIGN;3,10   10 DAY MAX
2920 :ENTER;V31     FC BASE PIPELINE
2930 :ENTER;V32     FC DEPOT PIPELINE BY BASE
```

```
2940 :ENTER;3       TOTAL PIPELINE
2950:ENTER;V5    FC AWAITING MATE
2960 RTEST:TEST G;S*V5,0,NIX
2970 :TEST G;S*V4,0,RWAIT    TS AWAITING MATE?
2980:LEAVE;V5    REDUCE FC AWAITING MATE
2990:LEAVE;V4    REDUCE TS AWAITING MATE
2992 :SPLIT;1,LINKB
3000:TRANSFER;,DCOMP    SEND TO DEPOT
3010*
3020 RWAIT:TEST E;S*V20,0,RDUC2    ANY SINGLE CANS
3030:ADVANCE;1    WAIT ONE DAY
3040:LOOP;3PH,RTEST    LOOP FOR 10 DAY MAX
3050*
3052 :TEST NE;S*V5,0,NIX
3060 :TEST G;S*V20,0,TSTTS      ANY FC SINGLE CANS
3070*
3080 RDUC2:LEAVE;V20      REDUCE FC CANS
3090 :LEAVE;V5
3100 :ASSIGN;4,3      CODE AS SINGLE FC
3110 :SPLIT;1,RRITE
3120 :LINK;1,FIFO
3130 TSTTS:ASSIGN;4,1
3140 :LEAVE;V5
3150 :SPLIT;1,BDMMD      BASE UNFILLED DEMAND
3160 :TEST G;XH*PH1,0,NOTS    ANY SPARE TS'S?
3170:SAVEVALUE;PH1-,1,XH    REDUCE TS STOCK
3180 RCODE:SPLIT;1,RRITE
3190 RLEFT:ASSIGN;3,1    CODE AS TS
3195 :ENTER;V30      TS TOTAL PIPELINE
3200:ASSIGN;2,0    CODE AS GOOD
3210:TRANSFER;,BTOB
3220*
3230 RRITE:ASSIGN;3,2    CODE AS FC
3240:ASSIGN;2,1    CODE AS FAILED
3250 :LEAVE;V31      FC READY TO SHIP
3260:TRANSFER;,BTOB
3270*
3280 NOTS:SAVEVALUE;PH1-,1    TAKE MISSILE DOWN
3290:SPLIT;1,RCODE
3300 SMLE1:SPLIT;1,CHECK
3310*
3320 RDMMD:LINK;V11,FIFO    FC AWAITING MATE
3330*
3340:GENERATE;90,0,,,1,2PH
3350 :ASSIGN;2,15      MAX NO. OF BASES
3360 OUT:ASSIGN;1,V22      REVERSE SEQUENCE
3370 :SAVEVALUE;16,PH1      SAVE BASE NUMBER
3380 :HELPA;1,FN*PH1,V21
3390 :SAVEVALUE;V24,0,XH
3400 :SAVEVALUE;V25,0,XH
3410 :SAVEVALUE;V26,0,XH
```

```
3420 :LOOP;2PH,OUT
3430 :SAVEVALUE;17+,1      QTR NUMBER
3440:TERMINATE;1
345081:VARIABLE;S1*S2
346082:VARIABLE;15+PH1
347083:VARIABLE;XH*PH1*XH*V2
348084:VARIABLE;9+PH1
349085:VARIABLE;25+PH1
350088:VARIABLE;30+PH1
351089:FVARIABLE;XF*PH1*.0054*300-EXPECTED NO. OF REMOVALS * 100
352090:VARIABLE;5+PH1
353091:VARIABLE;20+PH1
354092:VARIABLE;35+PH1
355093:VARIABLE;90
356094:VARIABLE;30
357095:VARIABLE;14
358096:VARIABLE;CH*V11*XH*PH1
359097:VARIABLE;CH*V12*XH*V2
360098:VARIABLE;CH*V10*XH*V2*XH*PH1
361099:VARIABLE;40+PH1
362100:VARIABLE;55+PH1
363021:VARIABLE;CH*V11*CH*V12
364022:VARIABLE;16-PH2
365023:VARIABLE;(FN*PH1-XH*V28)+X? *PH1      CURRENT UP MISSILES
366024:VARIABLE;115+PH1
367025:VARIABLE;130+PH1
368026:VARIABLE;145+PH1
369028:VARIABLE;185+PH1     PREVIOUS MONTHS POSS MISSILES
370029:VARIABLE;70+PH1      TS BASE PIPELINE
371030:VARIABLE;85+PH1      TS TOTAL PIPELINE BY BASE
372031:VARIABLE;100+PH1      FC BASE PIPELINE
373032:VARIABLE;115+PH1      FC TOTAL PIPELINE BY BASE
373533:VARIABLE;160+PH1
3750*
376081:FUNCTION;XF17,D21      POSS MISSILES - BASE 1
377085,59/6,66/7,62/8,62/9,61/10,61/11,61/12,60/13,60
378014,60/15,59/16,59/17,59/18,59/19,59/20,58/21,58
379022,58/23,58/24,58/25,57
3800*
381082:FUNCTION;XF17,D21      POSS MISSILES - BASE 2
382085,89/6,98/7,93/8,92/9,92/10,91/11,91/12,90/13,90
383014,89/15,89/16,89/17,89/18,88/19,88/20,88/21,87
384022,87/23,87/24,86/25,86
3850*
386083:FUNCTION;XF17,D21      POSS MISSILES - BASE 3
387085,118/6,131/7,124/8,123/9,122/10,122/11,121/12,120/13,120
388014,119/15,119/16,119/17,118/18,118/19,117/20,117/21,117
389022,116/23,116/24,115/25,115
3900*
391084:FUNCTION;XF17,D21      POSS MISSILES - BASE 4
392085,148/6,164/7,155/8,154/9,153/10,152/11,151/12,150/13,150
```

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3930814,149/15,149/16,148/17,148/18,147/19,147/20,146/21,146
3940822,145/23,145/24,144/25,144
3950*
396085:FUNCTION;XF17,D21      POSS MISSILES - BASE 5
397085,177/6,197/7,186/8,185/9,183/10,182/11,182/12,181/13;180
3980814,179/15,178/16,178/17,177/18,177/19,176/20,175/21,175
3990822,174/23,174/24,173/25,172
4000*
401086:FUNCTION;XF17,D21      POSS MISSILES - BASE 6
402085,207/6,229/7,217/8,215/9,214/10,213/11,212/12,211/13,210
4030814,209/15,208/16,207/17,207/18,206/19,205/20,205/21,204
4040822,203/23,203/24,202/25,201
4050*
406087:FUNCTION;XF17,D21      POSS MISSILES - BASE 7
407085,237/6,262/7,248/8,246/9,245/10,243/11,242/12,241/13,239
4080814,239/15,238/16,237/17,236/18,235/19,235/20,234/21,233
4090822,232/23,231/24,231/25,230
4100*
411088:FUNCTION;XF17,D21      POSS MISSILES - BASE 8
412085,266/6,295/7,279/8,277/9,275/10,274/11,272/12,271/13,269
4130814,268/15,268/16,267/17,266/18,265/19,264/20,263/21,262
4140822,261/23,260/24,259/25,259
4150*
416089:FUNCTION;XF17,D21      POSS MISSILES - BASE 9
417085,296/6,328/7,310/8,308/9,306/10,304/11,303/12,301/13,299
4180814,298/15,297/16,296/17,295/18,294/19,293/20,292/21,291
4190822,290/23,289/24,288/25,287
4200*
4210810:FUNCTION;XF17,D21      POSS MISSILES - BASE 10
422085,296/6,328/7,310/8,308/9,306/10,304/11,303/12,301/13,299
4230814,298/15,297/16,296/17,295/18,294/19,293/20,292/21,291
4240822,290/23,289/24,288/25,287
4250*
4260811:FUNCTION;XF17,D21      POSS MISSILES - BASE 11
427085,296/6,328/7,310/8,308/9,306/10,304/11,303/12,301/13,299
4280814,298/15,297/16,296/17,295/18,294/19,293/20,292/21,291
4290822,290/23,289/24,288/25,287
4300*
4310812:FUNCTION;XF17,D21      POSS MISSILES - BASE 12
432085,325/6,360/7,341/8,339/9,336/10,335/11,333/12,331/13,329
4330814,328/15,327/16,326/17,325/18,324/19,123/20,322/21,320
4340822,319/23,318/24,317/25,316
4350*
4360813:FUNCTION;XF17,D21     POSS MISSILES - BASE 13
437085,444/6,492/7,465/8,462/9,459/10,456/11,454/12,451/13,449
4380814,447/15,446/16,444/17,443/18,441/19,440/20,438/21,437
4390822,435/23,434/24,432/25,431
4400*
4410814:FUNCTION;XF17,D21      POSS MISSILES - BASE 14
442085,592/6,655/7,619/8,615/9,611/10,608/11,605/12,602/13,599
4430814,597/15,595/16,593/17,591/18,589/19,587/20,585/21,583
```

```
4440#22,581/23,579/24,577/25,575
4450*
4460#15:FUNCTION;XF17,D21      POSS MISSILES - BASE 15
4470#5,887/6,983/7,929/8,923/9,917/10,912/11,908/12,903/13,898
4480#14,895/15,892/16,889/17,886/18,883/19,880/20,877/21,874
4490#22,871/23,868/24,865/25,862
4500*
4510#16:FUNCTION;PH1,D15      49 SPARE G+Cs
4520#1,1/2,2/3,2/4,3/5,4/6,4/7,5/8,5/9,6/10,6
4530#11,6/12,7/13,9/14,12/15,18
4531*
4532#17:FUNCTION;PH1,D15      TS CANS
4533#1,10/2,10/3,10/4,10/5,10/6,20/7,20/8,20/9,20/10,20
4534#11,30/12,30/13,30/14,30/15,30
4535*
4536#18:FUNCTION;PH1,D15      FC CANS
4537#1,10/2,10/3,10/4,10/5,10/6,20/7,20/8,20/9,20/10,20
4538#11,30/12,30/13,30/14,30/15,30
4539*
4550 :START;24,,1
4560 :END
4570$:ENDJOB

ready

*

*
```

```
10000$,R(AC) :,8,16,30;;,8,19
200:IDENT:[redacted]
300:LIMITS:,,,10E
400:FORTY:DECK
500:PRMFL:C*,U,S,MEAN/MSUBS.B
60      SUBROUTINE HELP1(IPOSS,NMCS)
70      CHARACTER TEXT1*60
80      CHARACTER TEXT2*60
90      CHARACTER TEXT3*60
100      CHARACTER TEXT4*60
110      TEXT1 = "     ** MISSILES **  ** FAILURES **   **   SPARES    **"
120      TEXT2 = "  ** MSLES AWAIT **   * AWAIT MATE/CAN * DEPOT PIPELINE *
130     1*"
140      TEXT3 = "BASE POS    UP  % UP   TS  FC BOTH     TS  CANS  FC  CANS
150     1"
160      TEXT4 = "     TS  FC  BOTH          TS    FC       BTOB INUK DTOB"
170      IBASE = LOADXF(16)
180      IQTR = LOADXF(17)
190      IF(IQTR.LT.5)RETURN
191      NQTR=IQTR-4
192      IF(NQTR.GT.1) GO TO 5
194      CALL STORXF(21,0)
195      CALL STORXF(22,0)
199 5    CONTINUE
200      IF(IBASE .NE. 1) GO TO 7
205      CALL STORXF(19,0)
207      CALL STORXF(20,0)
210      WRITE(6,100)TEXT1,TEXT2
220      WRITE(6,101)TEXT3,TEXT4
230      WRITE(6,102) NQTR
240 100  FORMAT(1H1,A60,A60)
250  101 FORMAT(1X,A60,A60)
260  102 FORMAT(1HO,10HQUARTER = ,I2)
270   7  MATETS = ISTO2(IBASE+9)
280      MATEFC = ISTO2(IBASE+25)
290      NEEDBT = ICHA2(IBASE+5)
300      NEEDTS = ICHA2(IBASE+20)
310      NEEDFC = ICHA2(IBASE+35)
320      MSLSUP = LOADXF(IBASE)
322      CALL STORXF(19,LOADXF(19)+IPOSS)
324      CALL STORXF(20,LOADXF(20)+MSLSUP)
330      UPPCT = FLOAT(MSLSUP)/FLOAT(IPOSS)*100.0
340      IBTOB = LOADXN(IBASE+70)
350      IBTOB = LOADXN(IBASE+85)
360      MTSCAN = ISTO2(IBASE+40)
```

```
      NFCCAN = IST02(IBASE+55)
      NTSSPR = LOADXH(IBASE)
      NFCSPR = LOADXH(IBASE+15)
      INURK = LOADXH(IBASE+100)
      ITSFL = LOADXH(IBASE+115)
      IFCFL = LOADXH(IBASE+130)
      IBOTHF = LOADXH(IBASE+145)
      URITE(6,20)IBASE,IPOSS,MSLSUP,UPPCT,ITSFL,IFCFL,IBOTHF,NTSSPR,
     1NTSCAN,NFCSPR,NFCCAN,NEEDTS,NEEDFC,NEEBBT,MATETS,MATEFC,IBTOD,
     2INURK,IDTOB
  20  FORMAT(1H0,I3,1X,2(I5,1X),F5.1,2X,3(I2,2X),2X,2(2X,I2,3X,I3),
     18X,2(I2,2X),1X,I3,8X,2(I3,3X),5X,I3,1X,I4,2X,I3)
      IF(IBASE.LT.15) RETURN
      TOTMIS=LOADXF(19)
      TOTUP=LOADXF(20)
      CALL STORXF(21,LOADXF(21)+LOADXF(20))
      TOTUPPCT=TOTUP/TOTMIS*100.
      ITOT=TOTUPPCT
      URITE(6,30)TOTMIS,TOTUP,TOTUPPCT
      CALL STORXF(22,LOADXF(22)+ITOT)
  30  FORMAT(1H0,/,2X,F6.0,F7.0,"  TOTAL % AVAIL = ",F8.4)
      IF(NQTR.LT.19)GO TO 200
      AVUP=FLOAT(LOADXF(21))/FLOAT(NQTR)
      AVPCTUP=FLOAT(LOADXF(22))/FLOAT(NQTR)
      URITE(6,300)AVUP,AVPCTUP
 300  FORMAT(" ",/,"AVE NO UP = ",F10.3,"AVE PCT UP = ",F10.4)
 200  RETURN
      END
      SUBROUTINE HELP2(IBASE,INOUT,K)
      GO TO(1,2,3,4,5,6),K
    1 IB = IBASE+70
      IBTOD = LOADXH(IB)
      CALL STORXH(IB,IBTOD+INOUT)
      RETURN
    2 IB = IBASE+85
      IDTOB = LOADXH(IB)
      CALL STORXH(IB,IDTOB+INOUT)
      RETURN
    3 IB = IBASE+100
      INURK = LOADXH(IB)
      CALL STORXH(IB,INURK+INOUT)
      RETURN
    4 IB = IBASE+115
      ITSFL = LOADXH(IB)
      CALL STORXH(IB,ITSFL+INOUT)
      RETURN
    5 IB = IBASE+130
      IFCFL = LOADXH(IB)
      CALL STORXH(IB,IFCFL+INOUT)
      RETURN
    6 IB = IBASE+145
```

```
740       IBOTHF = LOADXH(IB)
750       CALL STORXH(IB,IBOTHF+INOUT)
760       RETURN
770       END
780       SUBROUTINE HELP3(IBASE,MU)
782       XMU=FLOAT(MU)/100.
785       NBASE = 160 + IBASE
790       NPOIS=0
800       A=EXP(-XMU)
810       S=1.
820 4     CALL PTIME(RN1)
830       RN1=UNIFM1(RN1)
840       S=S*RN1
850       IF(S-A)9,7,7
860 7     NPOIS=NPOIS+1
870       GO TO 4
880 9     CALL STORXH(NBASE,NPOIS)
885       RETURN
890       END

ready
*
*
```

This section may only be meaningful to GPSS programmers. It describes the storages, chains, save values, and locations of data initialization statements in the program.

AIM-7F NUMBERING SCHEME

	STORAGES
1	Depot Stock - TS
2	Depot Stock - FC
3	Total Pipeline (turnaround time)
10-24	TS Awaiting Mate to Depot
26-40	FC Awaiting Mate to Depot
41-55	TS Single Cans
56-70	FC Single Cans
71-85	TS Base Time to Ship
86-100	TS Total Pipeline
101-115	FC Base Time to Ship
116-130	FC Total Pipeline
	CHAINS
1	Base Unfilled Demands at Depot
6-20	Down Missiles Needing TS and FC
21-35	Down Missiles Needing TS
26-50	Down Missiles Needing FC
	FULLWORD SAVEVALUES
1-15	Up Missiles
16	Base Number (used for subroutine)
17	Quarter Number
18	-1 (for subroutine)

19	Possessed Missiles
20	Up Missiles
21	Total Number Available Missiles
22	Average Percent Available Missiles

HALFWORD SAVEVALUES

1-15	TS Base Spares
16-30	FC Base Spares
31-45	Expected Number of Removals
71-85	Base to Depot Pipeline
86-100	Depot to Base Pipeline
101-115	Inwork Pipeline
116-130	Cause of Missile Failure - TS
131-145	Cause of Missile Failure - FC
146-160	Cause of Missile Failure - TS and FC
186-200	Previous Months Up Missiles

DATA REFERENCE SHEET

LINE NO	DESCRIPTION
320	Initial TS Cans
330	Initial FC Cans
450	P(TS FC Fail/Failure) (.185)
1580	P(TS Fail/Failure TS FC Failure) (.750)
2100	Maximum number of days awaiting mate to depot or single can (10)-TS
2910	Maximum number of days awaiting mate to depot or single can (10)-FC
3350	Maximum number of bases (15)
3510	Monthly failure rate (.0054)

3550	Depot inwork time (90 days)
3560	Base to depot transportation (30 days)
3570	Depot to base transportation (14 days)
3740	Defines depot pipeline interval breakdown (0-133, 134, 135,....194)
3760-4490	Possessed missiles by base by quarter
4510-4530	Initial TS and FC spares by base
4550	Simulation length (24 qtrs)
4556	Frequency of GPSS output generation (1 every quarter)

OUTPUT STORAGES	DESCRIPTION
71-85	Base turnaround time - TS
101-115	Base turnaround time - FC
86-100	Pipeline time (resupply time) - TS
116-130	Pipeline time (resupply time) - FC
3	Total turnaround time (all bases)

SAMPLE OUTPUT

The output below is from the 10th quarter of a 20 quarter run. The first page will make the most sense to non-GPSS programmers. The other pages give detailed information about system usage, and statistics on various legs of the pipelines. The program and data which generated this report are given in Chapter V.

BASE	POS	MISSILES UP	% UP	FAILURES TS	FC	BOTH	SPARES TS	CANS	FC	CANS	MSLES AVAIL TS	FC	BOTH	AVAIL MAINT/CAN TS	FC	DEPOT PIPELINE BTOD	INVN	DTOD
QUARTER = 10																		
1	59	59	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	89	89	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
3	119	117	98.3	0	2	0	0	0	0	0	0	0	2	0	0	2	2	
4	149	145	97.3	3	0	0	0	0	0	0	0	0	4	0	0	2	6	
5	178	175	98.3	1	0	0	0	0	0	0	1	0	2	1	0	0	5	
6	206	206	99.0	3	0	0	0	0	0	0	0	0	2	0	0	4	2	
7	235	233	97.9	3	0	0	0	0	0	0	0	0	5	0	0	0	9	
8	268	267	99.6	1	0	0	0	0	0	0	0	0	1	0	0	0	3	
9	297	293	98.7	2	0	1	0	0	0	0	0	0	4	0	0	2	6	
10	297	293	98.7	2	1	1	0	0	0	0	1	1	2	0	0	3	4	
11	297	295	99.3	1	1	0	1	0	0	0	0	0	2	0	1	0	5	
12	327	326	99.7	1	1	1	0	0	0	0	0	1	0	0	1	0	6	
13	446	444	99.6	0	3	0	0	0	0	0	2	0	0	2	0	4	5	
14	595	592	99.5	0	0	2	0	0	0	0	0	0	3	0	0	0	13	
15	892	885	99.2	5	1	5	0	0	0	0	0	0	7	0	0	3	19	
...53. 6612. TOTAL % AVAIL = 99.1329																		

• SNAP STATISTICS • ABSOLUTE CLOCK = 1350 RELATIVE CLOCK = 1350 TERMINATION TO GO = 9

BLOCK COUNTS

	CURRENT	TOTAL		CURRENT	TOTAL		CURRENT	TOTAL		CURRENT	TOTAL		CURRENT
1# GENERT	0	1	2# SPLIT	0	15	3# SAVEX	0	15	4# SAVEX	0	15	5# ENTER	0
6# ENTER	0	15	7# TRANSF	0	15	8# GENERT	0	14	9# SPLIT	0	210	10# SAVEX	0
11# SAVEX	0	225	12# SAVEX	0	225	13# HELPA	0	225	14# SPLIT	0	1229	15# TERM	0
16# ADVANC	0	1054	17# TRANSF	0	1054	18# HELPA	0	210	19# SPLIT	0	420	20# ASSIGN	0
21# SPLIT	0	420	22# SAVEX	0	210	23# SPLIT	0	420	24# LINK	8	210	25# TEST	0
26# TEST	0	210	27# UNLINK	0	16	28# SAVEX	0	16	29# SAVEX	0	16	30# SAVEX	0
31# TERM	0	16	32# LINK	66	843	33# ENTER	0	210	34# ENTER	0	210	35# ENTER	0
36# ENTER	0	210	37# ENTER	0	210	38# HELPA	0	313	39# HELPA	0	313	40# LEAVE	0
41# LEAVE	0	313	42# ADVANC	2	313	43# HELPA	0	311	44# SPLIT	0	622	45# ASSIGN	0
46# ASSIGN	0	311	47# HELPA	0	1246	48# ADVANC	37	1246	49# HELPA	0	1157	50# ENTER	0
51# GATE	0	1783	52# UNLINK	0	1783	53# LOGIC	0	1783	54# TERM	0	1743	55# TEST	0
56# TEST	0	1753	57# TRANSF	0	872	58# LOGIC	0	911	59# LINK	0	911	60# LEAVE	0
61# LEAVE	0	872	62# LOGIC	0	872	63# HELPA	0	872	64# ADVANC	9	872	65# HELPA	0
66# SAVEX	0	863	67# SAVEX	0	863	68# LEAVE	0	863	69# LEAVE	0	863	70# LEAVE	0
71# TRANSF	0	863	72# TRANSF	0	844	73# HELPA	0	632	74# SAVEX	0	632	75# SPLIT	0
76# SPLIT	0	1274	77# LINK	4	637	78# TEST	0	637	79# TEST	0	620	80# UNLINK	0
81# SAVEX	0	73	82# SAVEX	0	73	83# TERM	0	73	84# TEST	0	1222	85# UNLINK	0
86# SAVEX	0	251	87# SAVEX	0	251	88# TEST	0	1222	89# UNLINK	0	106	90# SAVEX	0
91# SAVEX	0	106	92# TEST	0	1222	93# UNLINK	0	526	94# SAVEX	0	526	95# SAVEX	0
96# SAVEX	0	526	97# TEST	0	1222	98# UNLINK	0	364	99# UNLINK	0	364	100# SAVEX	0
101# LINK	24	364	102# ASSIGN	0	637	103# ENTER	0	637	104# ENTER	0	637	105# ENTER	0
106# ENTER	0	637	107# TEST	0	5735	108# TEST	0	5691	109# LEAVE	0	51	110# LEAVE	0
111# SPLIT	0	102	112# TRANSF	0	51	113# ASSIGN	0	103	114# LINK	8	103	115# TEST	0
116# ADVANC	3	5660	117# LOOP	0	5637	118# TEST	0	539	119# TEST	0	531	120# ASSIGN	0
121# LEAVE	0	531	122# SPLIT	0	1062	123# TEST	0	531	124# SAVEX	0	227	125# SPLIT	0
126# ASSIGN	0	531	127# ASSIGN	0	531	128# LEAVE	0	531	129# HELPA	0	1266	130# ADVANC	18
131# HELPA	0	1248	132# TEST	0	1248	133# TRANSF	0	626	134# ASSIGN	0	531	135# ENTER	0
136# ASSIGN	0	531	137# TRANSF	0	531	138# SAVEX	0	304	139# SPLIT	0	608	140# SPLIT	0
141# LINK	0	304	142# HELPA	0	207	143# SAVEX	0	207	144# SPLIT	0	414	145# SPLIT	0
146# LINK	2	207	147# TEST	0	207	148# TEST	0	198	149# UNLINK	0	39	150# SAVEX	0
151# SAVEX	0	39	152# TERM	0	39	153# ASSIGN	0	207	154# ENTER	0	207	155# ENTER	0
156# ENTER	0	207	157# ENTER	0	207	158# TEST	0	1396	159# TEST	0	1348	160# LEAVE	0
161# LEAVE	0	52	162# SPLIT	0	104	163# TRANSF	0	52	164# TEST	0	1296	165# ADVANC	2
166# LOOP	0	1294	167# TEST	0	107	168# TEST	0	102	169# ASSIGN	0	102	170# LEAVE	0
171# SPLIT	0	204	172# TEST	0	102	173# SAVEX	0	67	174# SPLIT	0	204	175# ASSIGN	0
176# ENTER	0	102	177# ASSIGN	0	102	178# TRANSF	0	102	179# ASSIGN	0	102	180# ASSIGN	0
181# LEAVE	0	102	182# TRANSF	0	102	183# SAVEX	0	55	184# SPLIT	0	110	185# SPLIT	0
186# LINK	0	55	187# GENERT	0	15	188# ASSIGN	0	15	189# ASSIGN	0	225	190# SAVEX	0
191# HELPA	0	225	192# SAVEX	0	225	193# SAVEX	0	225	194# SAVEX	0	225	195# LOOP	0
196# SAVEX	0	15	197# TERM	0	15								

UNUSED BLOCKS ARE NOT SHOWN

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STORAGES

- - AVERAGE UTILIZATION - -

REFERENCE	CAPACITY	AVERAGE CONTENTS	ENTRIES	AVERAGE TIME/UNIT	TOTAL TIME	AVAIL. TIME	UNAVAIL. TIME	CURRENT STATUS	PERCENT AVAILABILITY	CURRENT CONTENTS	MAXI CONTE
1#	2147483647	0.	372	0.	0.	0.	0.	A	100.00	0	
2#	2147483647	22.14	311	63.22	0.000	0.000	0.	A	100.00	39	
3#	2147483647	142.84	254	182.96	0.000	0.000	0.	A	100.00	191	
10#	2147483647	0.06	8	13.38	0.000	0.000	0.	A	100.00	0	
11#	2147483647	0.12	16	10.00	0.000	0.000	0.	A	100.00	0	
12#	2147483647	0.13	18	10.00	0.000	0.000	0.	A	100.00	0	
13#	2147483647	0.19	25	10.00	0.000	0.000	0.	A	100.00	0	
14#	2147483647	0.16	20	8.35	0.000	0.000	0.	A	100.00	1	
15#	2147483647	0.18	27	9.81	0.000	0.000	0.	A	100.00	0	
16#	2147483647	0.24	34	9.17	0.000	0.000	0.	A	100.00	0	
17#	2147483647	0.27	38	9.53	0.000	0.000	0.	A	100.00	0	
18#	2147483647	0.30	45	9.13	0.000	0.000	0.	A	100.00	0	
19#	2147483647	0.25	36	9.47	0.000	0.000	0.	A	100.00	0	
20#	2147483647	0.28	45	9.29	0.000	0.000	0.	A	100.00	0	
21#	2147483647	0.25	40	8.40	0.000	0.000	0.	A	100.00	0	
22#	2147483647	0.43	71	8.11	0.000	0.000	0.	A	100.00	2	
23#	2147483647	0.49	79	8.34	0.000	0.000	0.	A	100.00	0	
24#	2147483647	0.76	122	8.11	0.000	0.000	0.	A	100.00	0	
26#	2147483647	0.01	2	10.00	0.000	0.000	0.	A	100.00	0	
27#	2147483647	0.04	5	10.00	0.000	0.000	0.	A	100.00	0	
28#	2147483647	0.06	8	10.00	0.000	0.000	0.	A	100.00	0	
29#	2147483647	0.05	7	10.00	0.000	0.000	0.	A	100.00	0	
30#	2147483647	0.05	10	7.20	0.000	0.000	0.	A	100.00	0	
31#	2147483647	0.05	10	7.10	0.000	0.000	0.	A	100.00	0	
32#	2147483647	0.05	8	7.63	0.000	0.000	0.	A	100.00	0	
33#	2147483647	0.03	6	7.50	0.000	0.000	0.	A	100.00	0	
34#	2147483647	0.06	11	7.09	0.000	0.000	0.	A	100.00	0	
35#	2147483647	0.05	10	6.50	0.000	0.000	0.	A	100.00	0	
36#	2147483647	0.06	17	5.12	0.000	0.000	0.	A	100.00	1	
37#	2147483647	0.04	12	4.32	0.000	0.000	0.	A	100.00	1	
38#	2147483647	0.08	23	4.74	0.000	0.000	0.	A	100.00	0	
39#	2147483647	0.10	30	4.67	0.000	0.000	0.	A	100.00	0	
40#	2147483647	0.15	43	4.74	0.000	0.000	0.	A	100.00	0	
71#	2147483647	0.04	10	4.00	0.000	0.000	0.	A	100.00	0	
72#	2147483647	0.12	23	6.96	0.000	0.000	0.	A	100.00	0	
73#	2147483647	0.13	23	7.83	0.000	0.000	0.	A	100.00	0	
74#	2147483647	0.19	39	6.61	0.000	0.000	0.	A	100.00	0	
75#	2147483647	0.16	34	6.38	0.000	0.000	0.	A	100.00	1	
76#	2147483647	0.15	33	7.21	0.000	0.000	0.	A	100.00	0	
77#	2147483647	0.24	46	7.17	0.000	0.000	0.	A	100.00	0	
78#	2147483647	0.27	46	7.87	0.000	0.000	0.	A	100.00	0	
79#	2147483647	0.30	58	7.09	0.000	0.000	0.	A	100.00	0	
80#	2147483647	0.25	59	5.78	0.000	0.000	0.	A	100.00	0	
81#	2147483647	0.28	60	6.22	0.000	0.000	0.	A	100.00	0	
82#	2147483647	0.25	54	6.22	0.000	0.000	0.	A	100.00	0	
83#	2147483647	0.43	92	6.26	0.000	0.000	0.	A	100.00	2	

				- - AVERAGE UTILIZATION - -						
REFERENCE	CAPACITY	AVERAGE CONTENTS	ENTRIES	AVERAGE TIME/UNIT	TOTAL TIME	AVAIL. TIME	UNAVAIL. TIME	CURRENT STATUS	PERCENT AVAILABILITY	CURRENT CONTENTS	MAX CONTE
94#	2147483647	3.69	135	5.28	0.000	0.000	0.	A	100.00	8	
95#	2147483647	3.76	155	5.24	0.000	0.000	0.	A	100.00	8	
96#	2147483647	1.16	12	131.33	0.000	0.000	0.	A	100.00	1	
97#	2147483647	2.53	28	125.61	0.000	0.000	0.	A	100.00	1	
98#	2147483647	2.83	31	123.23	0.000	0.000	0.	A	100.00	5	
99#	2147483647	4.19	46	122.96	0.000	0.000	0.	A	100.00	6	
93#	2147483647	3.73	40	125.82	0.000	0.000	0.	A	100.00	5	
91#	2147483647	3.51	39	121.62	0.000	0.000	0.	A	100.00	4	
92#	2147483647	4.71	51	126.57	0.000	0.000	0.	A	100.00	5	
93#	2147483647	4.74	50	127.86	0.000	0.000	0.	A	100.00	6	
94#	2147483647	6.10	66	126.61	0.000	0.000	0.	A	100.00	7	
95#	2147483647	6.03	65	125.14	0.000	0.000	0.	A	100.00	6	
96#	2147483647	6.19	66	126.58	0.000	0.000	0.	A	100.00	6	
97#	2147483647	5.82	62	126.71	0.000	0.000	0.	A	100.00	6	
98#	2147483647	8.98	99	122.62	0.000	0.000	0.	A	100.00	7	
99#	2147483647	10.76	117	124.15	0.000	0.000	0.	A	100.00	10	
100#	2147483647	16.47	179	125.75	0.000	0.000	0.	A	100.00	16	
101#	2147483647	0.31	6	5.00	0.000	0.000	0.	A	100.00	0	
102#	2147483647	0.74	12	6.17	0.000	0.000	0.	A	100.00	0	
103#	2147483647	0.96	15	6.15	0.000	0.000	0.	A	100.00	0	
104#	2147483647	1.35	21	5.33	0.000	0.000	0.	A	100.00	0	
105#	2147483647	0.35	18	4.30	0.000	0.000	0.	A	100.00	0	
106#	2147483647	0.35	16	4.44	0.000	0.000	0.	A	100.00	0	
107#	2147483647	0.35	18	3.39	0.000	0.000	0.	A	100.00	0	
108#	2147483647	0.23	14	3.21	0.000	0.000	0.	A	100.00	0	
109#	2147483647	0.36	24	3.25	0.000	0.000	0.	A	100.00	0	
110#	2147483647	0.05	35	1.37	0.000	0.000	0.	A	100.00	0	
111#	2147483647	0.06	32	2.72	0.000	0.000	0.	A	100.00	1	
112#	2147483647	0.06	31	2.65	0.000	0.000	0.	A	100.00	1	
113#	2147483647	0.08	44	2.48	0.000	0.000	0.	A	100.00	0	
114#	2147483647	0.10	56	2.50	0.000	0.000	0.	A	100.00	0	
115#	2147483647	0.15	81	2.52	0.000	0.000	0.	A	100.00	0	
116#	2147483647	1.12	12	126.00	0.000	0.000	0.	A	100.00	1	
117#	2147483647	2.54	28	122.68	0.000	0.000	0.	A	100.00	1	
118#	2147483647	2.76	31	120.00	0.000	0.000	0.	A	100.00	3	
119#	2147483647	4.06	46	119.04	0.000	0.000	0.	A	100.00	6	
120#	2147483647	3.62	39	125.33	0.000	0.000	0.	A	100.00	4	
121#	2147483647	3.39	39	117.33	0.000	0.000	0.	A	100.00	4	
122#	2147483647	4.51	51	119.29	0.000	0.000	0.	A	100.00	5	
123#	2147483647	4.50	50	121.52	0.000	0.000	0.	A	100.00	4	
124#	2147483647	5.70	64	121.41	0.000	0.000	0.	A	100.00	7	
125#	2147483647	5.82	65	120.89	0.000	0.000	0.	A	100.00	6	
126#	2147483647	5.98	67	120.42	0.000	0.000	0.	A	100.00	5	
127#	2147483647	5.93	65	120.67	0.000	0.000	0.	A	100.00	5	
128#	2147483647	8.93	97	120.15	0.000	0.000	0.	A	100.00	5	
129#	2147483647	10.37	117	119.71	0.000	0.000	0.	A	100.00	10	
130#	2147483647	16.20	179	121.14	0.000	0.000	0.	A	100.00	16	

USER CHAINS

REFERENCE	MAXIMUM CONTENTS	AVERAGE CONTENTS	TOTAL ENTRIES	AVERAGE TIME/TRAN	CURRENT CONTENTS
1#	29	24.83	1857	34.60	24
2#	2	0.38	8	84.75	0
3#	5	1.58	24	34.92	3
4#	6	1.31	25	97.60	2
5#	5	2.15	37	78.83	4
10#	7	1.87	23	129.52	2
11#	6	1.66	22	83.32	2
12#	8	1.43	32	82.47	5
13#	7	1.65	32	82.28	1
14#	6	2.92	40	99.70	4
15#	11	2.92	51	77.25	2
16#	9	2.94	40	99.15	2
17#	5	1.75	32	80.63	0
18#	9	3.75	50	101.28	3
19#	13	3.84	52	87.92	5
20#	20	7.36	92	107.96	7
21#	2	0.06	8	7.50	0
22#	2	0.10	20	6.60	0
23#	2	0.10	26	5.38	0
24#	2	0.16	29	7.45	0
25#	5	0.15	29	7.03	1
26#	2	0.23	28	10.89	0
27#	5	0.29	60	9.95	0
28#	5	0.23	39	7.97	0
29#	5	0.25	30	9.06	0
30#	5	0.23	41	7.54	1
31#	2	0.11	30	3.04	0
32#	2	0.26	45	7.91	0
33#	5	0.37	73	9.45	2
34#	4	0.39	30	6.52	0
35#	4	0.44	134	9.02	0
36#	1	0.	5	0.	0
37#	1	0.03	14	2.14	0
38#	1	0.06	20	4.00	0
39#	2	0.06	20	2.00	0
40#	1	0.08	22	4.95	0
41#	2	0.12	25	6.36	0
42#	2	0.16	26	8.23	0
43#	2	0.03	24	1.54	0
44#	2	0.05	33	2.58	0
45#	2	0.06	33	2.64	1
46#	2	0.16	37	5.73	0
47#	2	0.12	37	4.54	1
48#	3	0.12	49	3.18	0
49#	2	0.09	42	1.95	0
50#	4	0.20	86	3.15	0

FULLWORD SAVEVALUES

NUMBER	CONTENTS	NUMBER	CONTENTS	NUMBER	CONTENTS	NUMBER	CONTENTS	NUMBER	CONTENTS	NUMBER	CONTEN
1#	59	2#	89	3#	117	4#	145	5#	175	6#	2
7#	233	8#	267	9#	293	10#	293	11#	295	12#	3
13#	444	14#	592	15#	885	16#	15	17#	16	18#	
19#	4459	20#	4419	21#	45326	22#	984				

HALFWORD SAVEVALUES

NUMBER - CONTENTS	NUMBER - CONTENTS	NUMBER - CONTENTS	NUMBER - CONTENTS	NUMBER - CONTENTS	NUMBER - CONTENTS
11# 1	31# 95	32# 144	33# 189	34# 233	35# 281
36# 330	37# 380	38# 427	39# 477	40# 466	41# 475
42# 529	43# 722	44# 959	45# 1425	73# 2	74# 2
79# 4	79# 2	80# 3	83# 4	85# 3	86# 1
92# 1	93# 1	94# 1	95# 3	100# 2	102# 2
103# 2	104# 6	105# 5	109# 2	107# 9	108# 3
109# 4	110# 4	111# 5	112# 6	113# 5	114# 13
115# 19	163# 2	164# 3	165# 1	166# 3	167# 3
168# 1	169# 3	170# 4	171# 2	172# 3	173# 9
174# 8	175# 9	186# 59	187# 89	188# 119	189# 149
190# 173	191# 208	192# 238	193# 268	194# 297	195# 297
196# 297	197# 327	198# 446	199# 595	200# 892	